

Surface pressure impact study: FEC and OSE

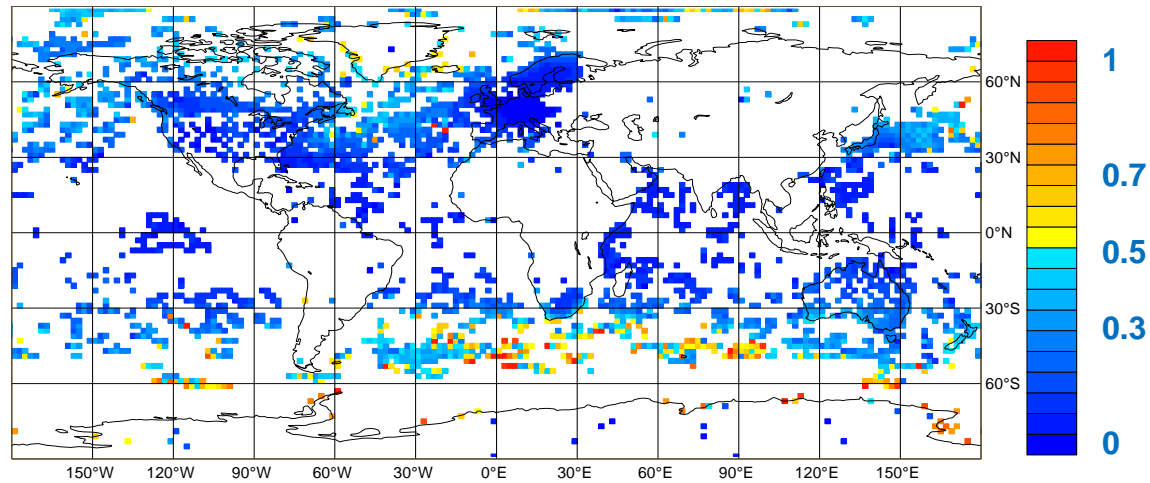
Gábor Radnóti, Carla Cardinali

Outline

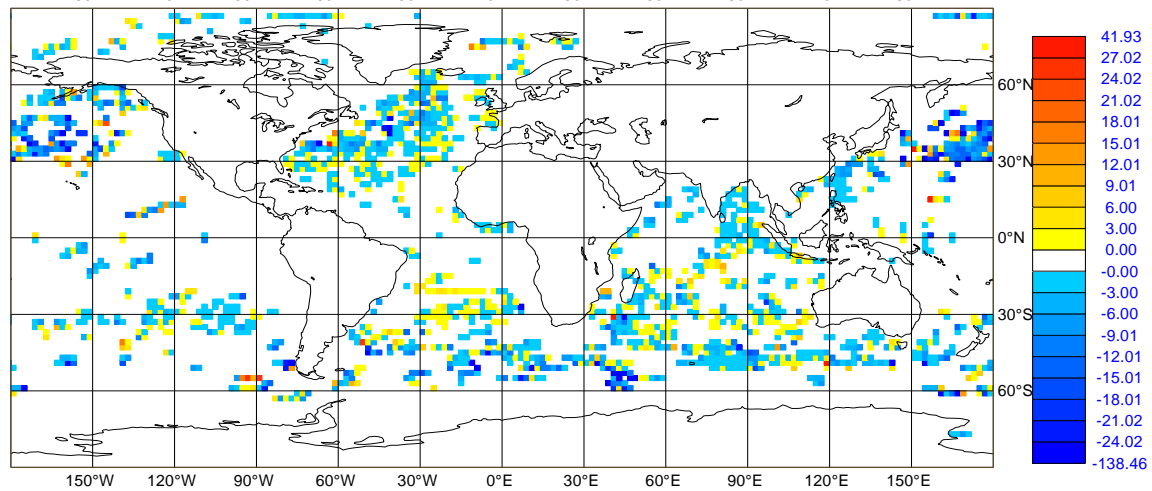
- **DFS&FEC and OSE experiment setup**
- **Data coverages**
- **Standard scores:**
 - **BUOY versus No-BUOY**
 - **Thinning BUOYs over the Northern-Atlantic**
- **Conclusions**

BUOYS-SHIP DFS and FEC Monthly Average

DFS



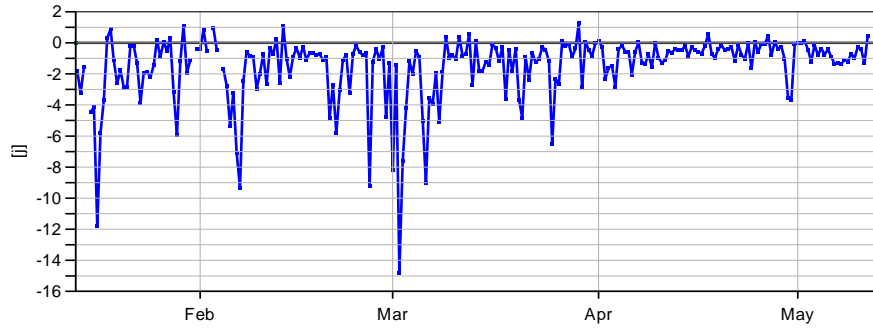
FEC



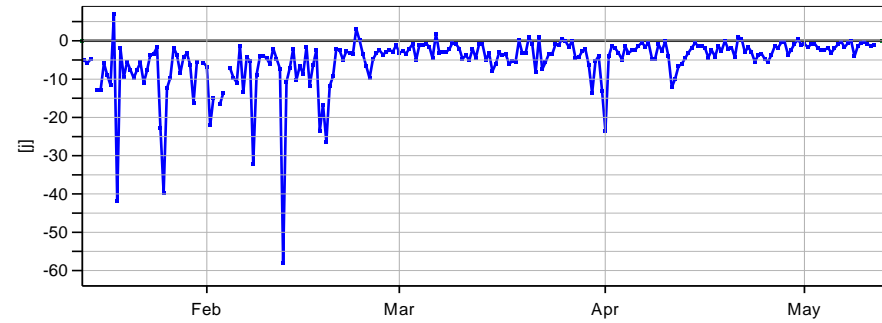
Min=-138
Max=41
Mean=-2.5

BUOYS FEC Time Serie

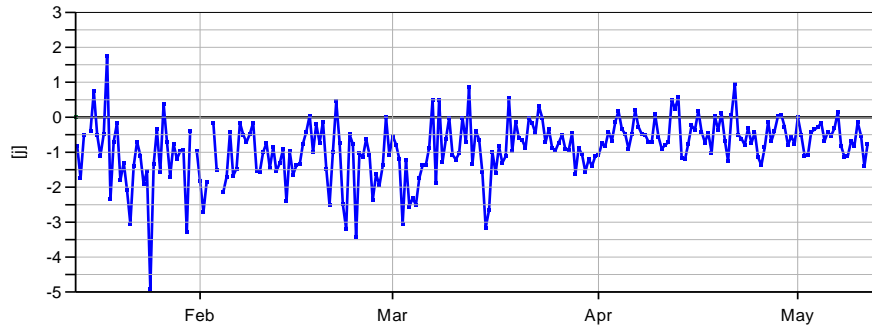
North Atlantic



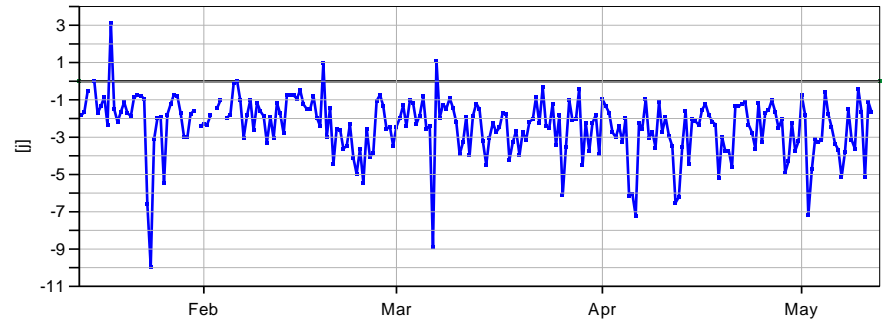
North Pacific



Tropic

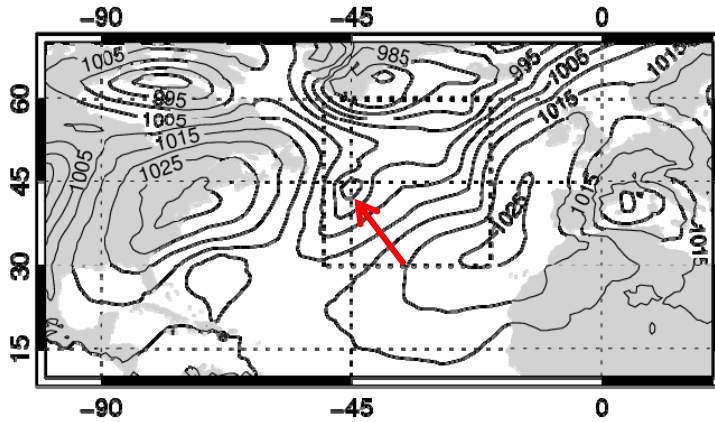


Southern Hemisphere

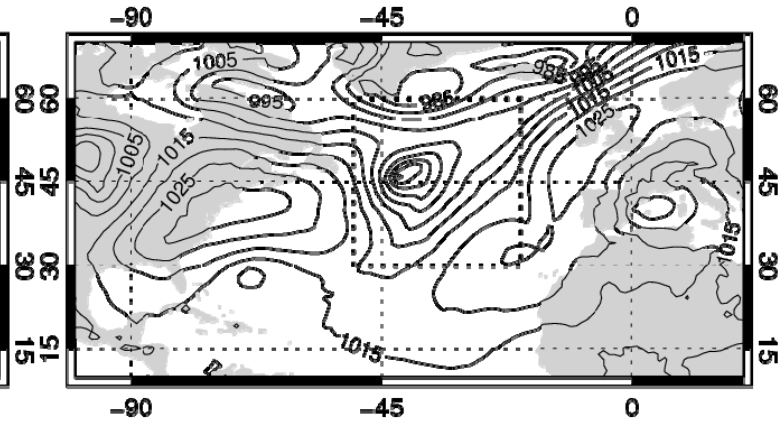


6th November: Case of a rapidly developing cyclogenesis

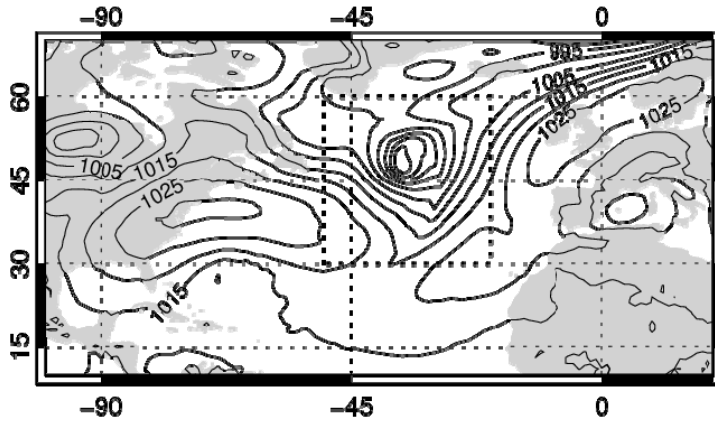
Analysis 00Z 6-Nov-2011



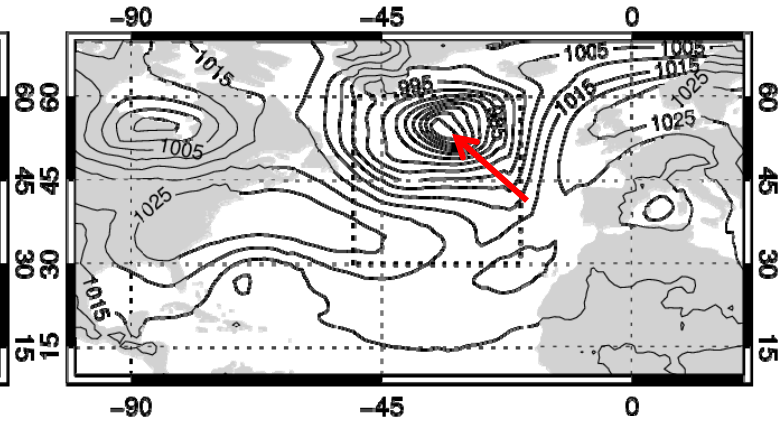
12Z 6-Nov-2011 **12h Forecast**



24h Forecast 00Z 7-Nov-2011



12Z 7-Nov-2011 **36h Forecast**

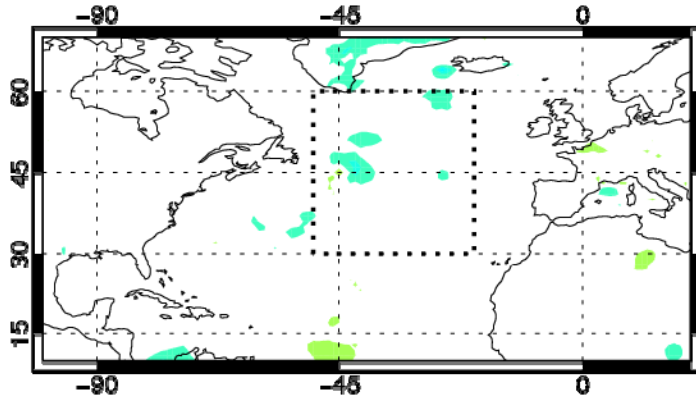


Minimum pressure from **990** to **950** hPa between 00Z 6/11 and 18Z 7/11

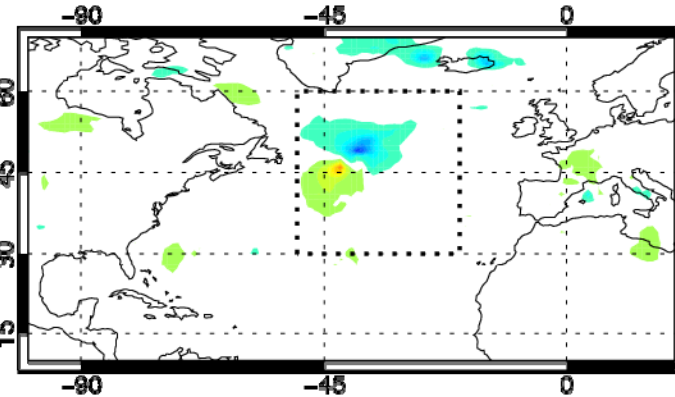
Mean sea level pressure: Evolved increments

Forecast valid at the same time but initiate from subsequent analyses

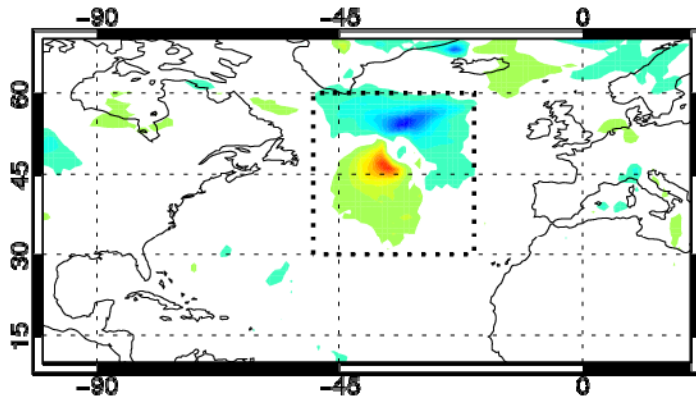
Increments 00Z 6-Nov-2011



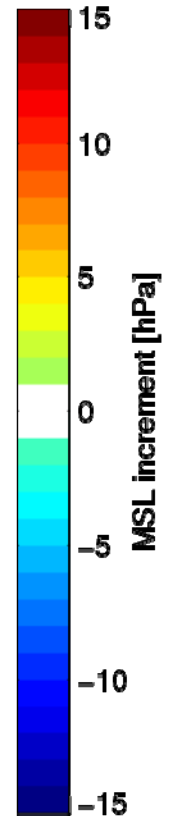
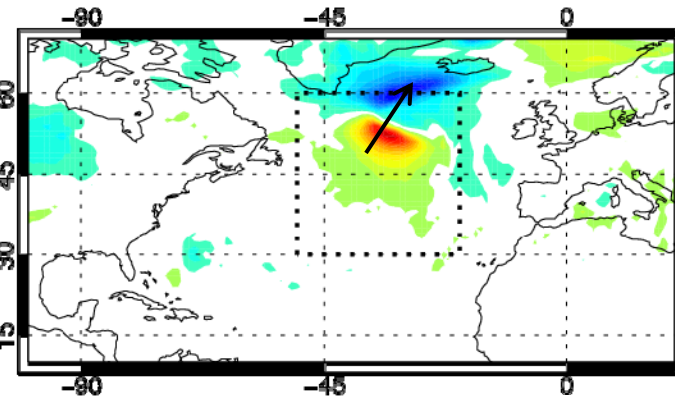
12-24h Forecast 12Z 6-Nov-2011



24-36h Forecast 00Z 7-Nov-2011

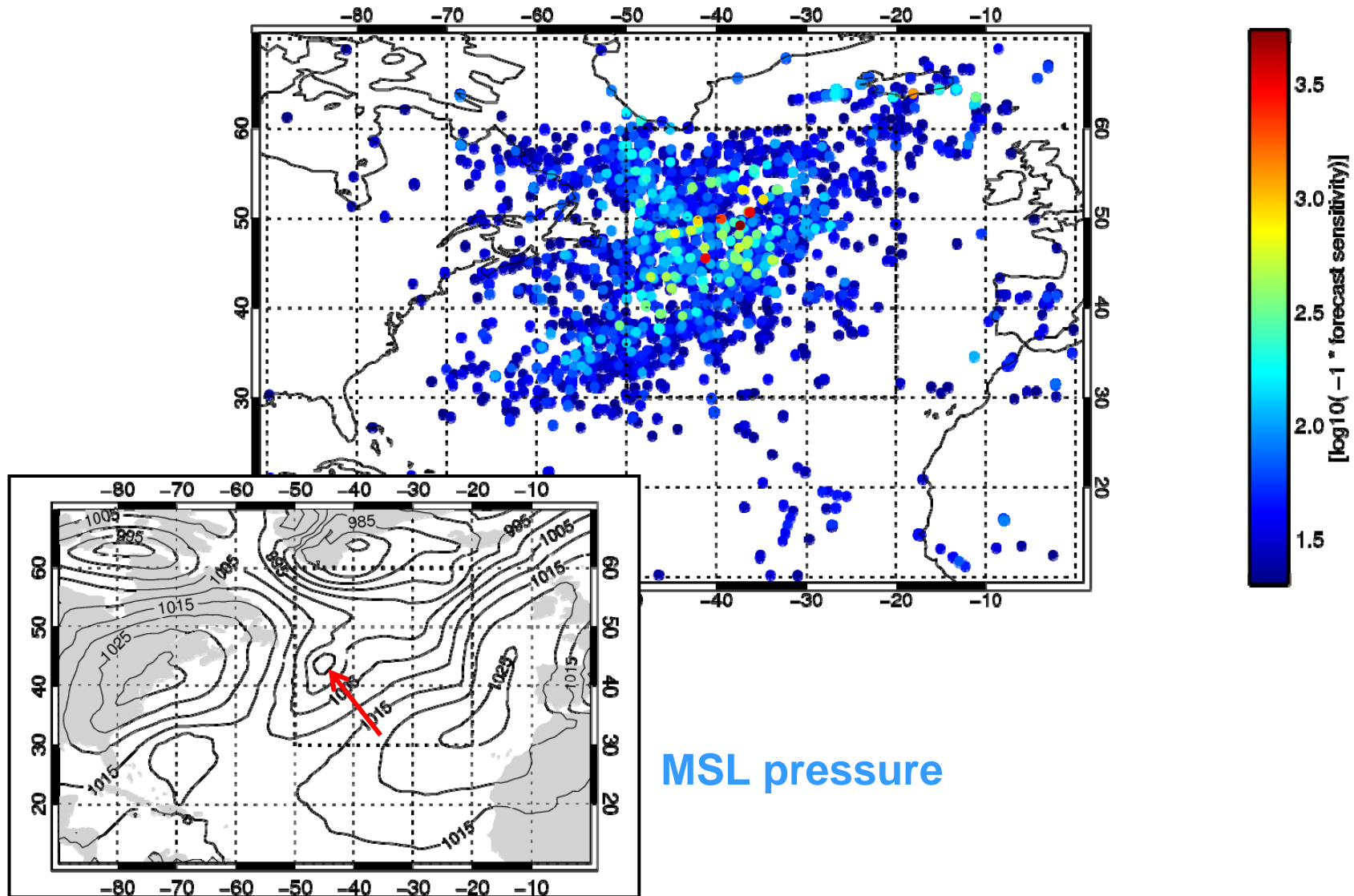


36-48h Forecast 12Z 7-Nov-2011



00Z 6th Nov analysis shifts the storm North West

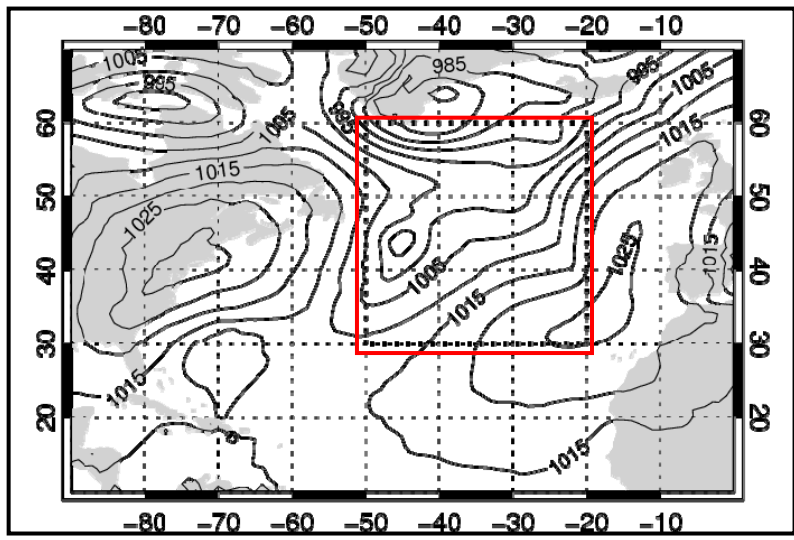
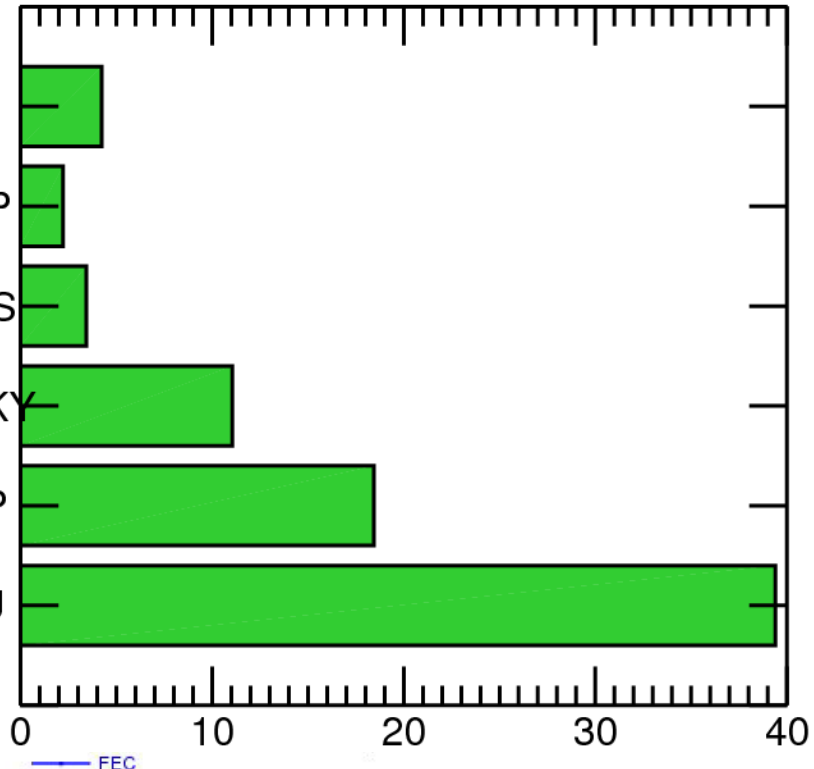
00Z 6th November FEC
All observations with FEC < -20 J



00Z 6th November FEC in the 30° x30°

All other observations
 AUTOMATIC SHIP
 NOAA 18 AMSUA RADIANCES
 DMSP 17 SSMIS RADIANCES ALL-SKY

AIREP
 DRIBU



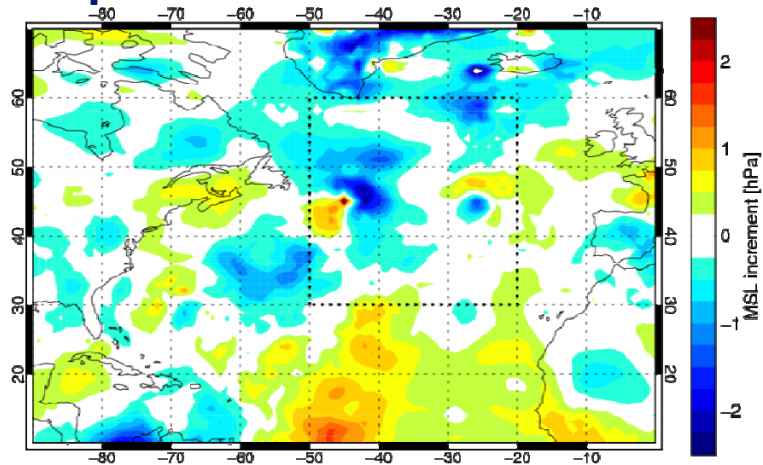
MSL pressure



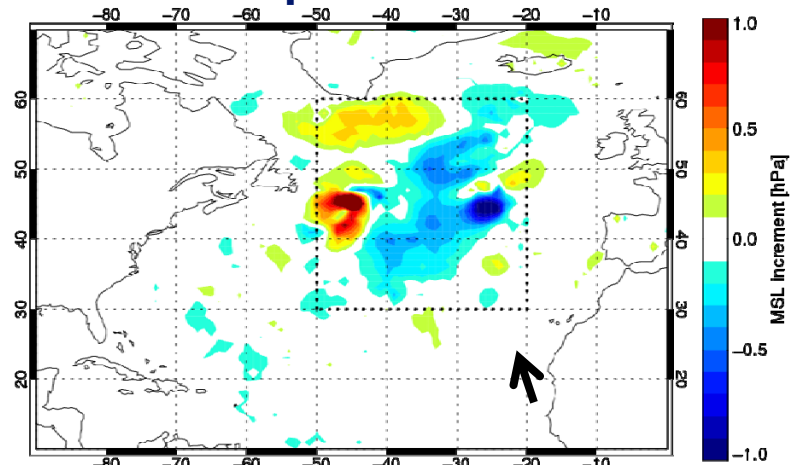
Denial OSEs vs. Operations

Mean sea-level pressure increment at 00Z, 6th November

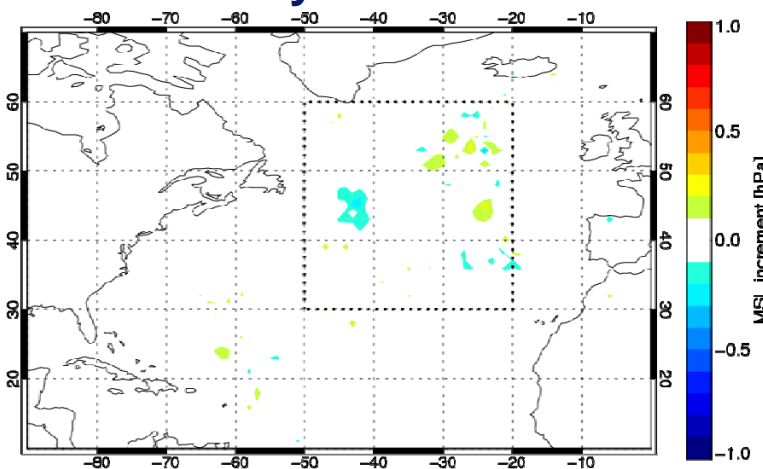
Operations: total increment



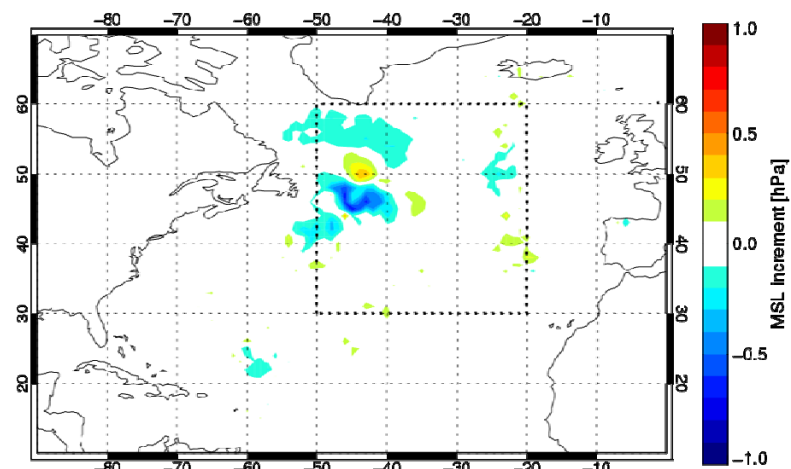
Ship and DRIBU



All-sky SSMIS F-17



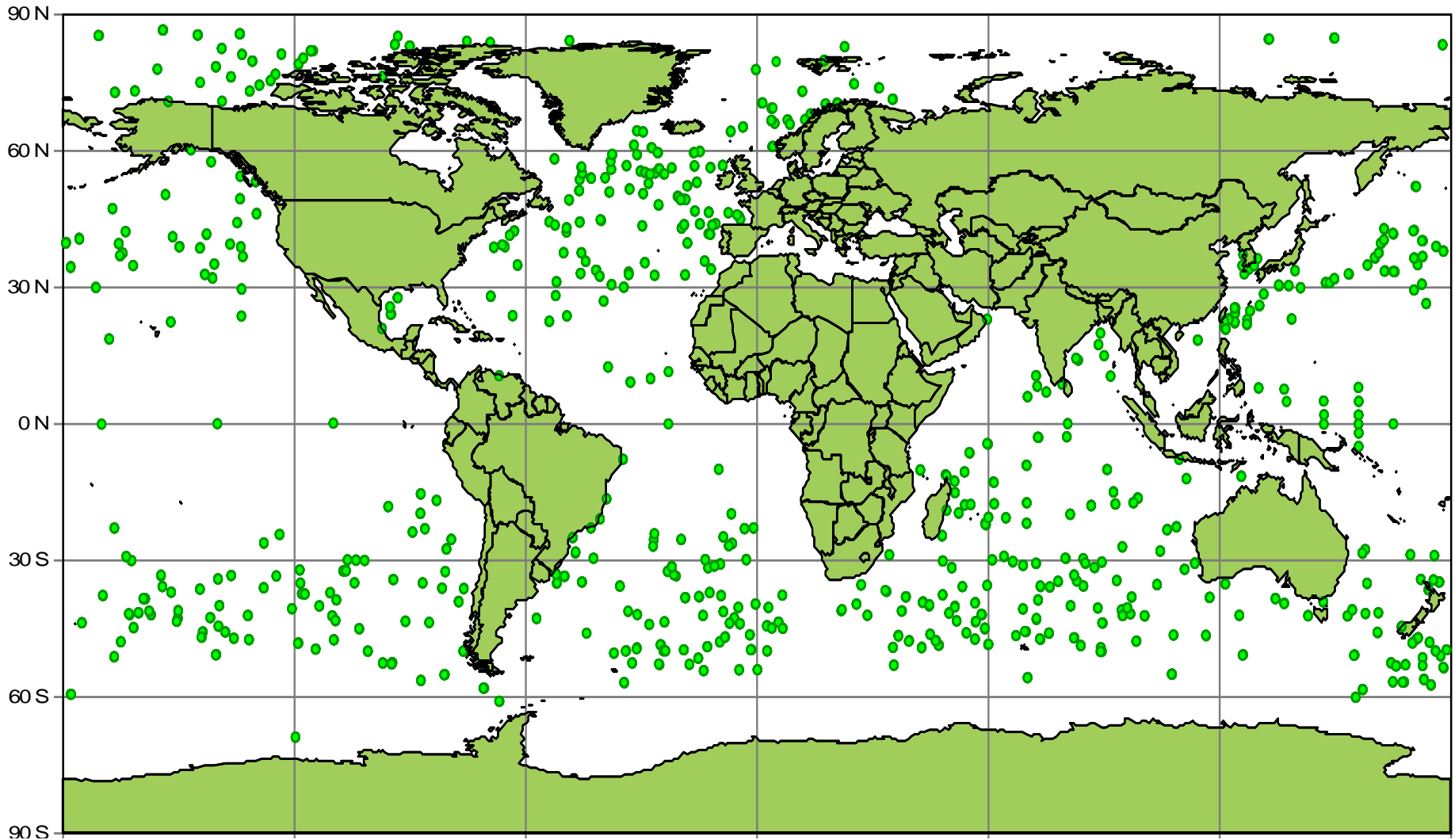
AIREP



OSEs

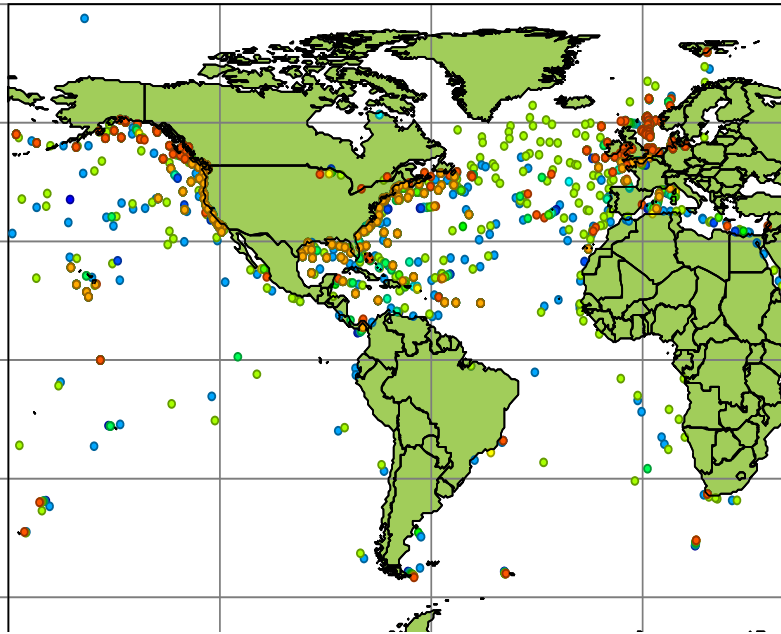
- **4D-Var Assimilation System : T511/T95/T159 IFS CY36R1**
- **Experiment period: 1 Dec 2008 to 26 January 2009**
- **3 scenarios:**
 - **Control**: Operational observation set
 - **SP Denial: Control - BUOY - Non-Synoptic time Ship**
 - **Control - 72 BUOYs in North-Atlantic - Non-Synoptic VOS ship data (to simulate the situation before the 2002 improved ESurfMar coverage)**

Data coverage: DRIBU global (01/01/2009)

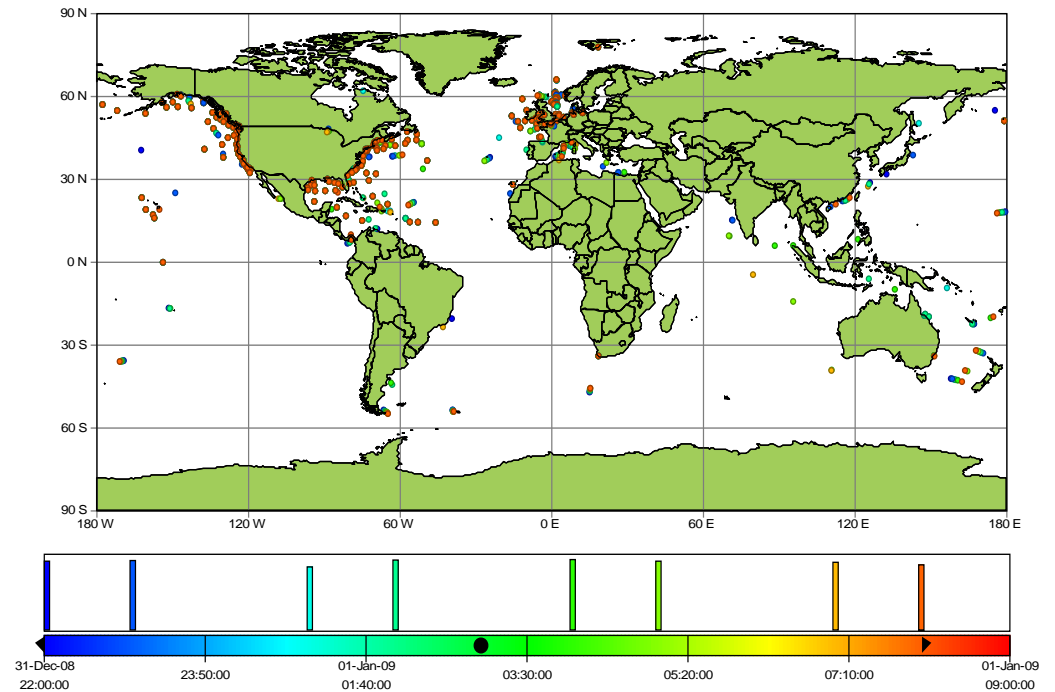


Data coverage for Ships

All data and non-synoptic time data

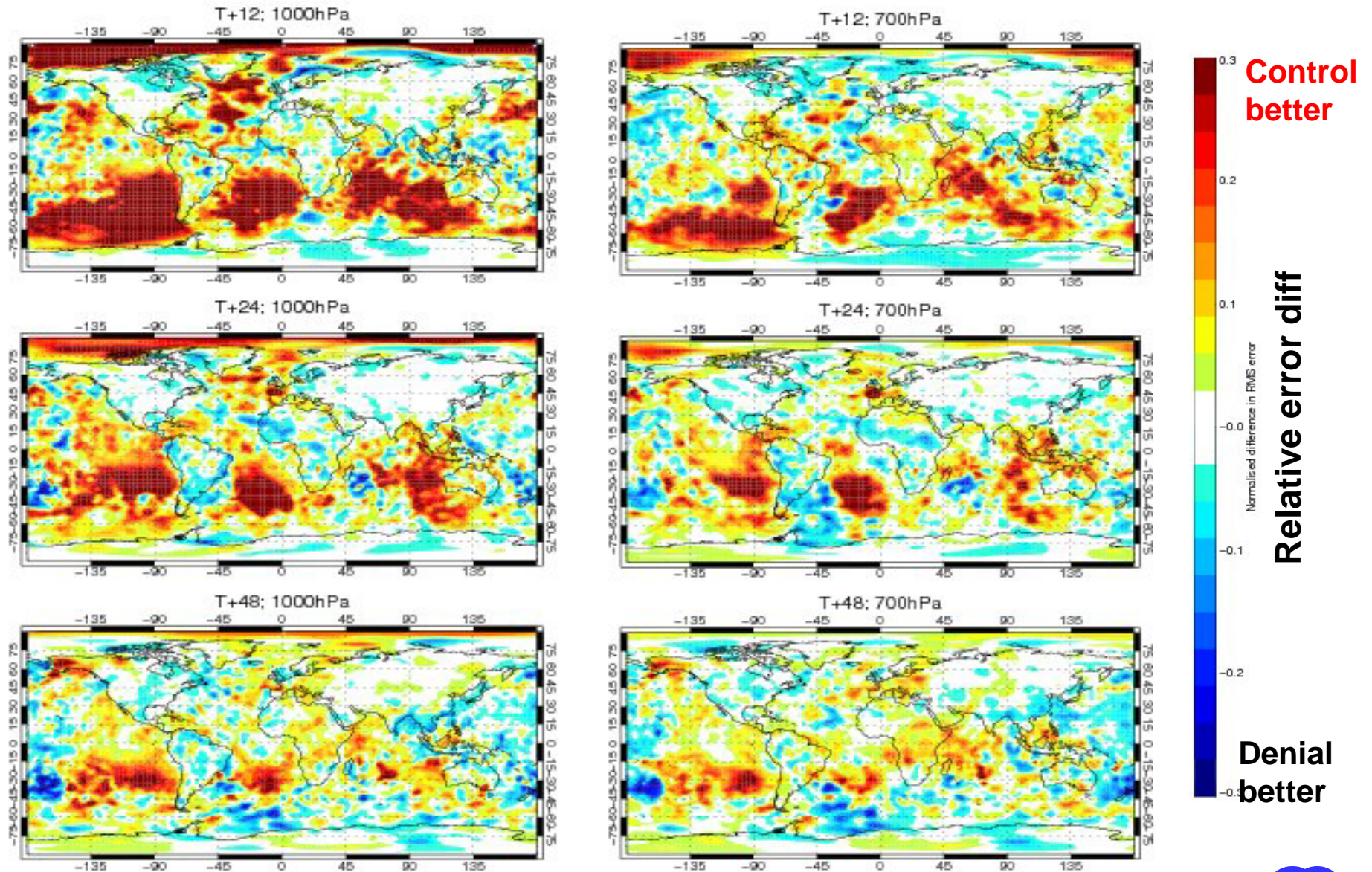


All



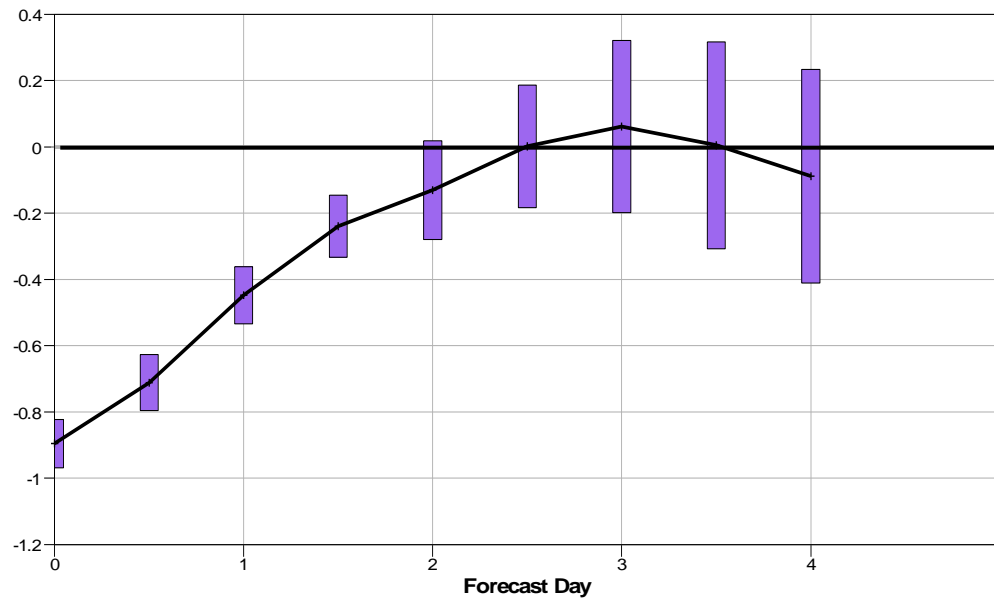
Non-Synoptic time

Results: SP-Denial versus Control



Results: SP-Denial vs Control

Root mean square error forecast
S.hem Lat -90.0 to -20.0 Lon -180.0 to 180.0
Date: 20081207 00UTC to 20090126 00UTC
1000hPa Geopotential 00UTC
Confidence: 90%
Population: 51

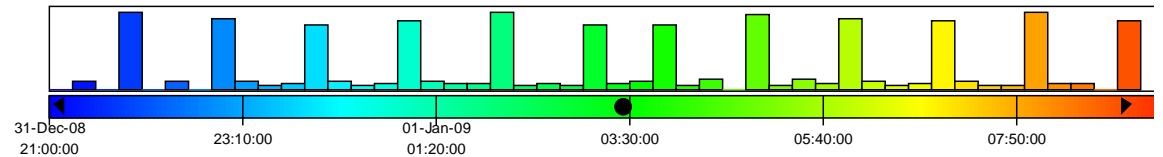
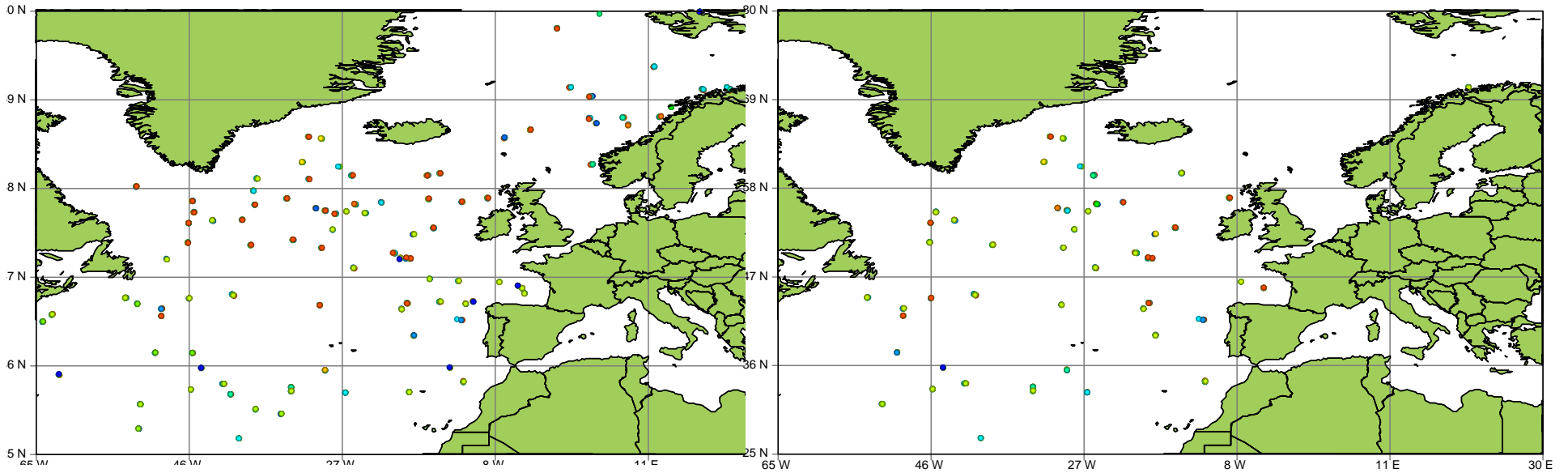


Difference significant up to 2

Data coverage for DRIBU in the N. Atlantic With and without "EsurfMar+" data

1038 Ps obs

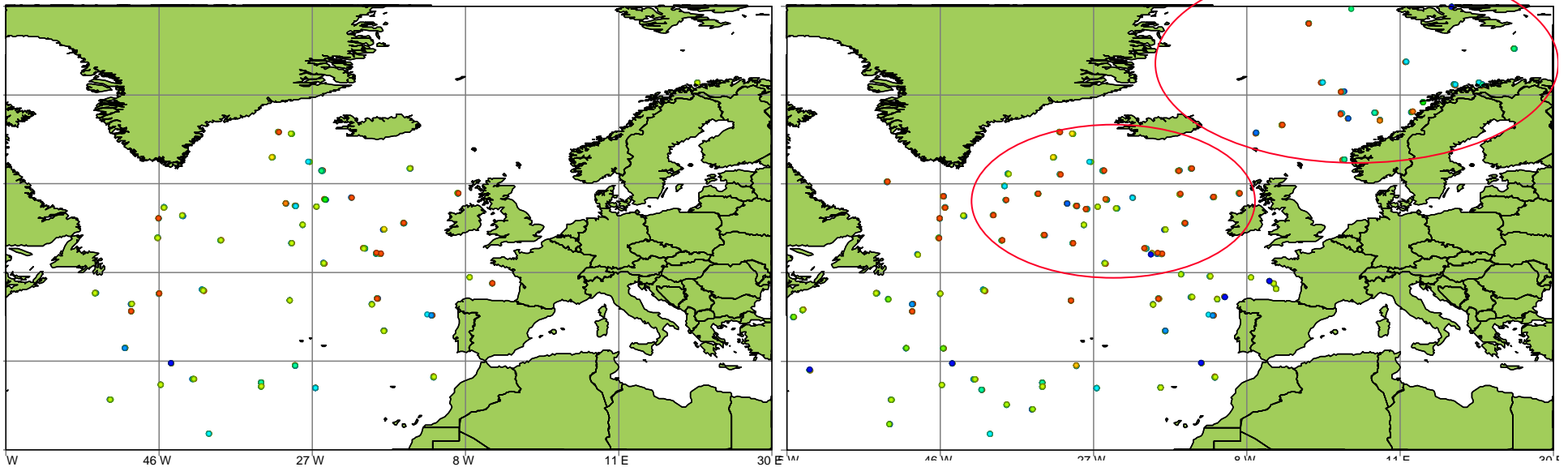
503 Ps obs



CTL

Thinned

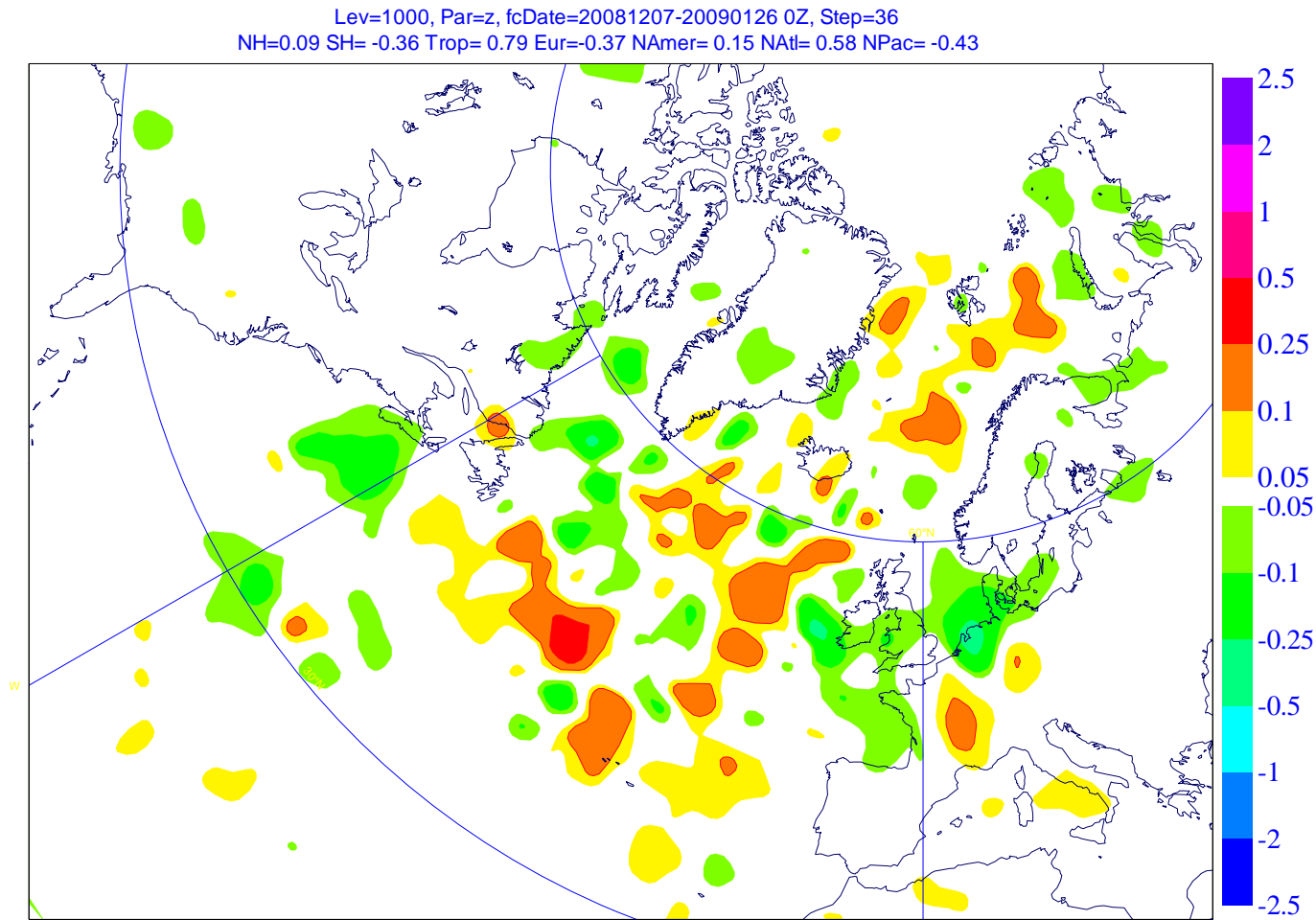
Data coverage for DRIBU in the N. Atlantic With and without EsurfMar+ data



Thinned

Un-thinned

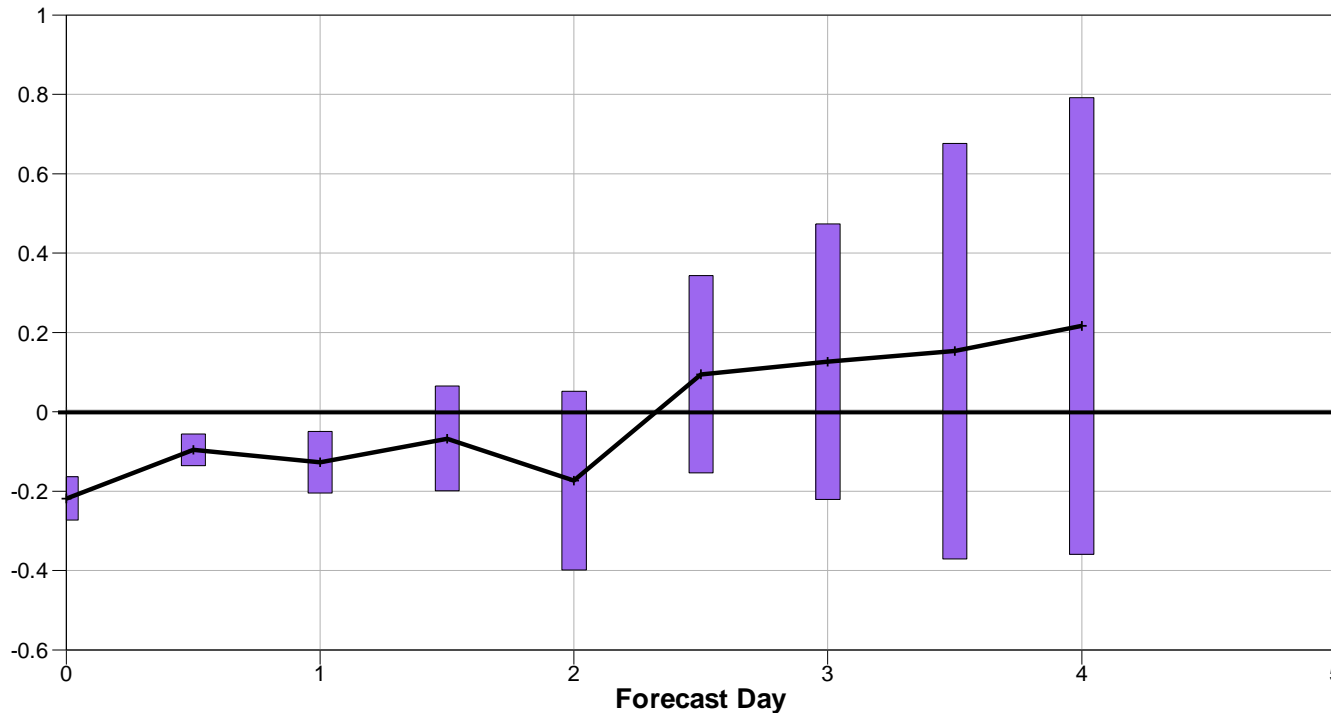
Results: Thinned E-SurfMar versus Control



T+36h: Overall positive impact over the sea, some of the positive impact is propagated over Europe.

Results: Thinned E-SurfMar versus Control

CTRL minus THIN
Root mean square error forecast
N.atl Lat 25.0 to 65.0 Lon -70.0 to -10.0
Date: 20081207 00UTC to 20090126 00UTC
1000hPa Geopotential 00UTC
Confidence: 90%
Population: 51



N. Atlantic positive impact of E-SurfMar data until T+48h. For longer forecasts the results are negative, but not significantly.

ESURFMAR denial scorecard

		rmsef	
n.hem	r	200hPa	
		500hPa	
		700hPa	
		850hPa	
		1000hPa	
	t	200hPa	
		500hPa	
		700hPa	
		850hPa	
		1000hPa	
	vw	200hPa	
		500hPa	
		700hPa	
		850hPa	
		1000hPa	
z	200hPa		
	500hPa		
	700hPa		
	850hPa		
	1000hPa		

		rmsef	
europe	r	200hPa	
		500hPa	
		700hPa	
		850hPa	
		1000hPa	
	t	200hPa	
		500hPa	
		700hPa	
		850hPa	
		1000hPa	
	vw	200hPa	
		500hPa	
		700hPa	
		850hPa	
		1000hPa	
z	200hPa		
	500hPa		
	700hPa		
	850hPa		
	1000hPa		

		rmsef	
n.atl	r	200hPa	
		500hPa	
		700hPa	
		850hPa	
		1000hPa	
	t	200hPa	
		500hPa	
		700hPa	
		850hPa	
		1000hPa	
	vw	200hPa	
		500hPa	
		700hPa	
		850hPa	
		1000hPa	
z	200hPa		
	500hPa		
	700hPa		
	850hPa		
	1000hPa		

Summary

- **3 assimilation experiments were performed to evaluate the impact of buoy data with special focus on E-SurfMar data.**
- **Global impact of DRIBU clearly positive, especially for the Southern Hemisphere, Arctic and N. Atlantic regions**
- **Impact is strongest at 1000hPa, but lasts up to 500hPa**
- **E-SurfMar impact over N. Atlantic is visible but moderate in terms of forecast score**